

CENG 311 - Computer Architecture

Programming Assignment #1

October 24, 2024

Assignment

Check the given codes `main.c`, `matrix.c`, `matrix.h`, `set.c`, and `set.h`. Fill out the empty functions as instructed on the given comment blocks for each function. Test your code. Then, submit just `matrix.c` and `set.c`. Do not modify `matrix.h` or `set.h`. Also, do not change the return type, function name, and parameters, and do not add or remove parameters.

Preliminary

You must know the fundamental [set theory](#), [sparse and dense matrices](#), and [C programming language](#).

Matrix Representation

All the matrices are represented dynamically in this assignment. A dense matrix can be represented as a two-dimensional array. Therefore, `matrix[i][j]` in the code corresponds to $matrix_{i,j}$ in mathematics. A sparse matrix can be represented as a set. This set has only matrix points, a dynamic integer array that includes three integers. The first element represents the i coordinate, the second element represents the j coordinate, and the last element represents the point's value. Therefore, $a_{i,j} = data$ corresponds to $(i, j, data)$. Since the main reason for using sparse matrices is to save the storage, we do not keep the points where their data is zero. The data is zero if there is no coordinate in the set.

Warnings

- Using artificial intelligence tools is strictly forbidden.
- Any kind of cheating will not be tolerated.
- You may need to use some functions like `realloc()`, `strcmp()`, `strcpy()`, and `strlen()`. You can search how to use them and what they do. You can use other functions; however, do not include another library. Use the functions defined in `stdio.h`, `stdlib.h`, and `string.h`.
- You can define helper functions if needed; however, do not change the structure of the provided functions.
- Do not modify the defined structures.
- You can use the given makefile, but you do not have to.